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Petterson, Richard
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Beaverhead River
inventory

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United States
Department of
Agriculture

Soil
Conservation
Service

Bozeman,
Montana

Beaverhead River Inventory

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BEAVERHEAD RIVER INVENTORY

ACKNOWLEDGEMENTS

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Richard H. Pettersen, Soil Conservationist
Soil Conservation Service
Dillon, Montana

March 1982

DOCUMENTS

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INTRODUCTION

Because the Beaverhead River has not been severely impacted by population growth or other social and economic impacts, the Beaverhead and the Ruby Conservation Districts requested an extensive physical inventory of the Beaverhead River to establish a benchmark survey. The districts will use the survey as a tool to measure future physical impacts and to direct future management decisions to maintain the present integrity of this valuable waterway and riparian resource. The inventory was extensive rather than intensive and designed to measure gross physical features of stream channel and bank conditions.

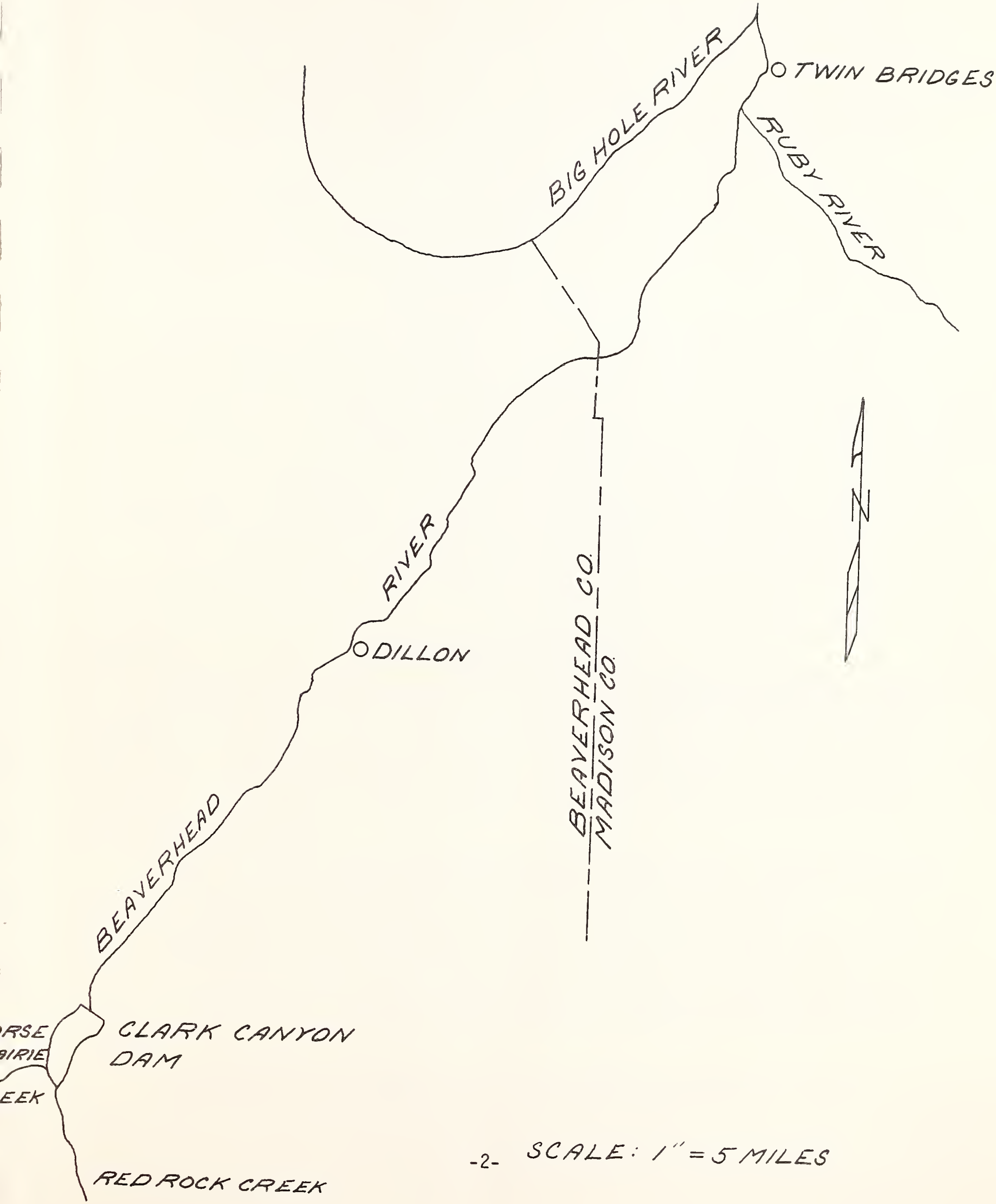
PHYSICAL FEATURES

The Beaverhead River begins at Clark Canyon Dam (elevation 5,500 feet) and flows approximately 79 miles north through Beaverhead and Madison counties to Twin Bridges where it joins the Big Hole and Ruby Rivers to form the Jefferson River (elevation 4,600 feet).

River flow is controlled mainly by the discharge from the Clark Canyon Dam. The dam is regulated to meet irrigation needs in summer months and to maintain adequate flows for fish habitat in winter months. The average low discharge rate is 150 cubic feet per second (cfs) in winter and 1,000 cfs during peak irrigation periods. Flows up to 4,000 cfs are possible during extreme runoff situations.

For the inventory, the Beaverhead River was divided into two reaches. The stream gradient and stream morphology of each reach is different. Reach 1 extends 17 miles north from Clark Canyon Dam to Barretts Diversion, and has an average gradient of 0.29 percent. Reach 2 extends 62 miles north from Barretts Diversion to the town of Twin Bridges and has an average gradient of 0.20 percent. Total channel length is approximately 79 miles with a bank length of twice that or 158 miles.

Figure 1



SCALE: 1" = 5 MILES

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The Montana Department of Fish, Wildlife, and Parks has classified the Beaverhead as Class I, Highest Value fishery resource, from the reservoir outflow to Grasshopper Creek 13 miles downstream. Heavy metal contamination from past mining activity adjacent to Grasshopper Creek has reduced the river's classification through the remainder of the river. From Grasshopper Creek to Stodden ditch (north of Dillon) the river is rated as Class II, High Priority fishery resource. Below Stodden ditch the river is rated as a Class III, Substantial fishery resource.

LAND USE AND CLIMATE

Agricultural activity along the river corridor consists mainly of irrigated hayland and pasture for livestock with some cropland bordering the lower reaches. Interstate Highway 15 and the Union Pacific Railroad encroach the river channel in the upper reaches of the river and some urban encroachment exists where the river flows through the town of Dillon.

The average frost free period ranges from 90 to 110 days and the average annual precipitation is 9 to 12 inches.

VEGETATION AND WILDLIFE

Vegetative types along the river corridor are primarily riparian shrubs and woodlands, pasture and hayland. Riparian vegetation consists of willow, cottonwood, water birch, rose, snowberry, red-osier dogwood, and a variety of grasses and forbs.

Mammals of the stream corridor include white-tail deer, mule deer, mink, muskrat, beaver, a few river otter, and a variety of small mammals.

Birds inhabiting the corridor include a variety of raptors (prairie falcons, golden eagles, hawks, owls), migratory waterfowl and numerous song birds.

The principal fish species of the Beaverhead River include mountain whitefish, long nose and white suckers, carp, burbot (Ling) and large

populations of brown and rainbow trout. The trout population above Battetts Diversion is characterized by large trophy sized brown and rainbow trout. This stretch is characterized by optimum fish habitat--overhanging riparian vegetation and cold water releases from the reservoir. They are the key factors in maintaining this exceptional trout population. The maintenance of the riparian vegetation is critical to the quality of the fishery and wetland wildlife habitat. Favorable reservoir releases during the spring and fall spawning seasons since 1975 has resulted in significant increases in the trout population above Barretts Diversion.

RECREATION

That the upper Beaverhead River supports an exceptional trout fishery is well known to fishermen. According to the Montana Department of Fish, Wildlife, and Parks, during the 1975-76 fishing season (most recent data) the river provided over 14,000 days of fishing. The presence of migratory waterfowl provides excellent fall duck hunting. River floating is the most popular form of access for fishing, hunting, and other types of recreation.

METHODS AND PROCEDURES

Aerial photographs (scale 1"/250' or 1:3000) of the river corridor were obtained in November 1979. The river survey was accomplished by three men floating the river in July 1980. Observations were recorded on field sheets and indexed photos. Physical alterations and resource problem areas were identified and marked on the photos during the survey. They were later measured and distances transferred to field sheets where they were totaled.

Aerial photographs, field sheets, and symbol legends for the Beaverhead River inventory are located at the Soil Conservation Service field offices at Dillon and Sheridan, Montana.

FINDINGS

Reach 1 is characterized by a narrow flood plain, a moderately steep gradient (0.29 percent) with gravelly streambed. Except where railroad and

highway right of ways infringe on the river, the riparian zone is relatively undisturbed. Stream outflows are directly controlled by the reservoir discharge. Approximately 18 percent (3 miles) of the river channel in this reach has been altered due to highway and railroad encroachment on the river channel. Of the 34 miles of streambank, approximately 17 percent (5.7 miles) are rock rip-rapped and 3 percent (1 mile) are in an eroding condition. Car bodies, concrete slabs, tires, and other debris deposited on the banks account for less than 1 percent of the streambank length. Overall stream stability and water quality of this reach are excellent. Trout populations in this reach are the highest in the river.

Reach 2 is characterized by a lower gradient (0.20 percent than reach 1) and broader floodplain. This reach has a higher sediment load and lower rock/gravel content in the streambed and banks than reach 1.

Less than 1 percent (700 feet) of the 62 miles of stream channel has been altered due to highway encroachment. Of the 124 miles of streambank 2 percent (3 miles) are rock rip-rapped and 9 percent (11 miles) are in an eroding condition. Concrete slabs, car bodies, junk, and other debris deposited on the streambank accounts for less than 1 percent of the streambank length. The overall condition of streambank vegetation and channel stability, water quality, and fish populations are lower than in reach 1, but are still considered satisfactory.

Bank erosion is the most serious resource problem in reach 2 at this time and appears to be due to streamflow conditions. Agricultural encroachment of streambanks is also a factor.

Streamflow, although mainly controlled by the Clark Canyon Dam, is not uniform throughout reach 2. Flows at the Point of Rocks and at Twin Bridges have exceeded the reservoir discharge by four times during

the fall and winter months. Groundwater return flows from flood irrigated lands along the river corridor contribute to a progressive increase in downstream flow. As a result, streambank erosion increases downstream; the sustained high water saturates bank soils that are highly erosive, reduces soil cohesiveness and causes stream instability. Accelerated bank erosion is most extensive where riparian vegetation is not present naturally or has been removed along the streambank by farming or grazing practices. However, in some reaches below the Point of Rocks, accelerated erosion is also occurring on areas with extensive woody bank vegetation. This erosion problem has been compounded by ten years of above average snowpack and increased streamflow, often exceeding 200 percent of normal, which resulted in extended periods of high runoff and increased streamflow. Actual reservoir outflows from September to April are less than inflows for storage purposes. Most of the high flow discharge is diverted for irrigation at Barretts and West Bench diversions.

Car bodies, concrete slabs, junk and debris placed on river banks, and the overgrazing and trampling of banks by livestock, contribute to streambank instabilities.

CONCLUSIONS AND RECOMMENDATIONS

1. Sustained high water during winter months in the lower reaches of the river in conjunction with the absence or removal of streambank vegetation resulting from farming and grazing practices are major contributions to Beaverhead River streambank instability.
2. Streambank vegetation plays a key role in streambank and channel stability and maintaining quality fish and wildlife habitat.
   - A. Where streambank vegetation has been removed, it is recommended that woody vegetation be re-established.
   - B. Where overgrazing of vegetation and trampling of streambanks by livestock results in streambank instability, it is recommended

that livestock watering and feeding should be accomplished off stream with limited livestock access to the river.

C. Existing streambank vegetation should be maintained and protected from agricultural and urban related encroachment.

3. Irrigation along the corridor should be managed to attain the highest practicable efficiencies to lessen the impact of subsurface return flows to the river.
4. Structural treatment of eroding banks, mainly rock rip-rap, should be limited to critical areas where valuable property and structures are threatened.
5. Removal of existing car bodies and debris is recommended where they clearly aggrevate stream instability.
6. Periodic inventories should be conducted to monitor impacts on and along the Beaverhead River.
7. Technical assistance from the Soil Conservation Service, Montana Department of Fish, Wildlife, and Parks, plus cost sharing assistance from the Agricultural Stabilization and Conservation Service for applicable conservation practices should be utilized in a coordinated effort to solve streambank stability and water quality problems.

BEAVERHEAD RIVER INVENTORY DATA

Physical Features	Unit	Percent of River Length
River length, mi./ft.	78.89/416,383	
Channel gradient--Clark Canyon Dam to Ruby River, %	0.2	
Channel alterations, ft.		
Left bank	1,715	0.4 [1/]
Right bank	3,850	0.9 [1/]
Both banks involved	13,000	3.1
Total both banks	31,565	3.8
Streambank alterations		
Rock riprap, ft.		
Left bank	30,766	7.4
Right bank	32,635	7.8
Total both banks	63,401	7.6
Car bodies, no.	66	
River gravel, ft.		
Left bank	745	0.2
Right bank	--	
Total both banks	745	0.2
Other alterations, ft.		
Left bank	2,975	0.7
Right bank	930	0.2
Total both banks	3,905	0.5
Eroding banks, ft.		
Left bank	26,815	6.4
Right bank	34,214	8.2
Total both banks	61,029	7.3
Bank mass wasting, ft.		
Left bank	500	0.1
Right bank	--	
Total both banks	500	<0.1
Vertical noneroding banks, ft.		
Left bank	880	0.2
Right bank	1,105	0.3
Total both banks	1,985	0.2
Irrigation diversion, no.		
Left bank	25	
Right bank	22	
Total both banks	47	
Irrigation return-flows, no.		
Left bank	2	
Right bank	7	
Total both banks	9	

[1/] Includes 13,000 ft. involving both banks.